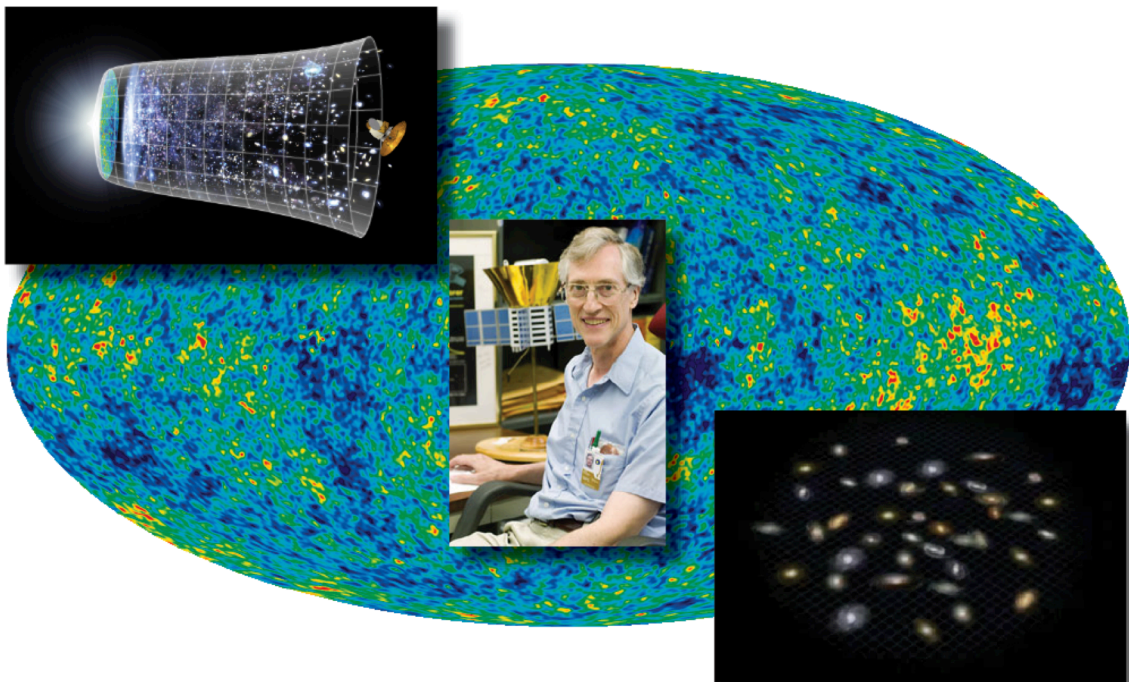




Universe Mash-Ups

Cosmology 101 Through Video Mash-up Projects



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Introduction

Ever see the President and First Lady's faces inserted into *American Gothic*, the painting by Grant Wood? Or maybe a video collage of Homer Simpson's many renditions of the word "d'oh"? These are examples of "mash-ups" – pieces (image, audio or video) created by combining two or more sources of media into a new derivative work.

Using the Cosmic Times Universe Mash-up Project, students will creatively connect with the science, history, and personalities behind our understanding of the expanding Universe. This project weaves together the artistic aspects of creating visual media with rigorous research and script-writing, giving students a better understanding of their topic while having a little fun.



Figure 1: Sample mash-up using Grant Wood's *American Gothic* painting and photos of pets.

General Lesson Information

The purpose of this lesson is to engage students in the big questions of our Universe through a media mash-up project-based lesson related to the Cosmic Times educational resources. The advantages of the lesson include engaging students, inspiring creativity, using media mash-up technology; acquiring knowledge through differentiated instruction; and presenting their knowledge, ideas and individual perspectives.

Estimated Class Time

3-5 class periods with home assignment component, as needed

Objectives

1. Students will gain a general understanding of how our understanding of the Universe has changed over time through new discoveries made possible by the development of knowledge and technologies.
2. Students will select a specific topic of interest to them that is related to the Cosmic Times materials and show evidence of their understanding of that topic through their completed projects.
3. Students will create a video from various media that reflects their research and ideas.
4. Students will share their projects with classmates.

National Education Standards

<p><i>Science Standards</i></p> <p>NS.9-12.1 Science as Inquiry</p> <p>NS.9-12.4 Earth and Space Science</p> <p>NS.9-12.5 Science and Technology</p> <p>NS.9-12.7 History and Nature of Science</p>	<p><i>Social Studies (History)</i></p> <p>NSS-WH.5-12 ERA 8: A Half-Century of Crisis and Achievement, 1900-145</p> <p>NSS-WH.5-12 ERA 9: The 20th Century Since 1945: Promises and Paradoxes</p>
<p><i>Technology Standards</i></p> <p>NT.K-12.1 Basic Operations and Concepts</p> <p>NT.K-12.2 Social, Ethical and Human Issues</p> <p>NT.K-12.3 Technology Productivity Tools</p> <p>NT.K-12.4 Technology Communication Tools</p> <p>NT.K-12.5 Technology Research Tools</p>	<p><i>Language Arts Standards</i></p> <p>NL-ENG.K-12.1 Reading for Perspective</p> <p>NL-ENG.K-12.3 Evaluation Strategies</p> <p>NL-ENG.K-12.4 Communication Skills</p> <p>NL-ENG.K-12.5 Communication Strategies</p> <p>NL-ENG.K-12.7 Evaluating Data</p> <p>NL-ENG.K-12.8 Developing Research Skills</p>
<p>Also meets the International Society for Technology in Education's National Educational Technology Standards for Students 1a, 1b, 2a, 2b, 2d, 3a, 3b, 3c, 3d, 4a, 4b, 4c, 4d, 5b.</p>	

Outline

1. *Engagement*
Students interact with the main concepts of the Cosmic Times materials in order to select a research topic.
2. *Exploration*
Students do the pre-production work for their video projects. They use the Cosmic Times resources and the NASA library of videos, images, and sound clips to research their topics and select media. They may also use online databases and selected web sites. Students use their research to write a treatment script, create a storyboard, and a final script.
3. *Explanation*
Students do the production and post-production of their video projects. Production may entail taking photos, creating voice-overs, and producing short clips of their own to use in their mash-up; though the main focus of this project is to use the provided existing media content. Finally, students stitch together their media to create their final video.
4. *Evaluation*
Students fill out a self-evaluation of their project and receive teacher feedback.
5. *Extension*
Students share their mash-ups with the class and provide feedback to classmates on their projects.

Background Information: Video Production

Video production has a well-established process, used by producers of the smallest and largest projects. This lesson plan offers resources to walk you and your students through this production process. Even though students will primarily be using existing video clips and media for their Universe Mash-up projects, they will need to follow the production process to create a project that is coherent with a clear message.



In this section you will find an outline of the overall process, so that you can keep an eye on the big picture as your students work on their Universe Mash-up projects.

Pre-Production

The pre-production steps represent the planning phases of video production. They are the steps that happen before the video camera is turned on, before voice-overs are recorded, and before video-editing software is opened up. Students will have a tendency to want to jump right in to production of the video projects, but the pre-production process is critical to creating a strong foundation for the final project. Be sure to give students plenty of time for pre-production and stress the importance of these steps.

1. *Project definition and research*

The project needs to be defined before any production can begin. During this step, students chose a topic for their project, research that topic, and determine what resources (images, video clips and audio clips) are available to them related to that topic.

2. *Treatment script*

A treatment script is essentially a detailed outline of what will go into the final video. Students should write a treatment script that describes the most important elements of the mash-up, including the supporting audio or video that will be used for each segment. The treatment script can be written as an outline or as a narrative, whatever is more comfortable for the student.

3. *Storyboard*

A storyboard is a series of annotated illustrations created to visualize the sequence of images in a movie prior to production. A storyboard allows the student to refine and examine the overall video before putting a lot of time and effort into the production process.

4. *Final script*

The final script takes the storyboard as a guide and then incorporates camera directions, existing clips to be used, voice-overs, and on-screen captions to give the final blueprint for the video project.

When the students are done with pre-production, they'll be ready to start producing their video project. They should know what voice-overs to record, what video clips to use, and what additional media they'll need to create to finish their projects.

Production

The production stage is when audio and video pieces are created and graphics are designed. Students will know exactly what media they will need to create from their final script – anything they want that is not an existing clip or graphic will need to be created.

5. Videography

Additional video footage may be required by the final script. The focus of the Universe Mash-up project is on using existing media, so encourage students to use as many available clips as possible. However, if they want additional video, a small point-and-shoot camera or even cellphone camera should do the trick. If your class has access to video equipment, use your own discretion to determine how you allow the students to use it.

6. Graphics creation

Additional images or graphics may be created for the video mash-up. These can be created using presentation software and saving the slides as image files that can be read by video editing software. If students take photos to include in their projects, they will need to get the permission of any people in the photo and make a note to add a credit for those people at the end of their video.

7. Voice-over recording

Voice-overs or on-screen captions will be key to pulling the video project together. Many computers have a microphone, which can be used, though it won't produce the best-quality recording. Microphones can be purchased relatively cheaply for somewhat better audio recordings. The students should already have the script for their voice-overs, from their final script written during pre-production.

8. Music

Video is often enhanced by music. Students may produce their own music or can find music tracks to use either as part of the video editing software or online. However, students will need to ensure that any music they use is not copyrighted.

At the end of the production phase, students will have all of the pieces to start assembling their video project.

Post-production

The post-production phase is when the video comes together as a final product. Students can finally open the video-editing software and put together all of the elements of their project into one video.



Many computers come with video editing software. However, if your school's computers do not, ask your local system administrator for assistance in choosing software to use. A quick Internet search for "free video editing software" will turn up several options. As always, use caution when choosing software to download from the Internet – download from reputable sources and read user reviews to be sure you do not inadvertently install malware.

9. Editing

Students may need to edit video clips and footage to remove unwanted portions. Then students should put the clips and images in the correct order.

10. Add audio

The recorded voice-overs need to be placed into the final product, lined up appropriately to the video and graphics that they were meant to support.

11. Transitions, titles, and music

Transitions help to bring the viewers attention from one video clip to the next. Titles are added to give the production a title, to identify speakers, to give further context to the images on the screen, and to provide credits at the end of the video. If students are using music, this should be added to enhance parts of the final video.

12. Encoding

Once students are happy with their final product, the editing software will need to encode the movie, outputting a video that can be played on generic video players.

13. Sharing

What good is a movie that no one can see? The movie should be shared with other members of the class, on a class website or wiki, or even with NASA for possible inclusion in a Universe Mash-up Student Gallery.

Engagement: Introduction

During the engagement, students will be given an overview of the project assignment and will be introduced to key Cosmic Times concepts. The ultimate goal of the engagement activities is for students to understand the mash-up project requirements and chose a topic for their projects.

Handouts used in the Engagement

- Cosmic Times Keyword Match Pre-test (page 18)
- KCLWM Chart (page 19)
- Cosmic Times Post Test (page 20)

Classroom Instruction

1. Pre-test

If your students do not have previous experience with the Cosmic Times materials, have them take the Keyword Match Pre-test. The results will help guide the amount of introduction and review you will need to do to prepare your students to work on their video mash-ups. (Pre-test answers: 1-H, 2-J, 3-F, 4-G, 5-B, 6-I, 7-D, 8-A, 9-C, 10-E)

2. KCLWM graphic organizer

A KCLWM chart is a graphical organizer that can be used to drive instruction and guide student learning. In this lesson plan, the KCLWM chart is used to help students choose a topic for their Universe Mash-up project. Students fill out different columns of the KCLWM chart as the Engagement progresses.

K is for what they KNOW about our understanding of the Universe. This should be used initially as a pre-assessment, though students can continue to fill out new items in this column as the lesson progresses.

C is for what a student has CONFIRMED about our understanding of the Universe. This will be filled out as the student watches/listens to the introductory presentation and as they proceed with their research.

L is for what a student has LEARNED about our understanding of the Universe. This will be filled out as the student watches/listens to the introductory presentation and as they proceed with their research.

W is for what a student WONDERS about our understanding of the Universe. Students fill this out at the end of the Engagement activities to help them come up with topics for their mash-up project.

Understanding the Universe				
K <i>What I think I know?</i>	C <i>What I have confirmed?</i>	L <i>What I have learned?</i>	W <i>What I wonder?</i>	M <i>What misconceptions?</i>
<i>Big question: how and why has our understanding of the universe changed over time?</i>				

Figure 2: Sample KCLWM chart for Universe Mash-ups

M is for MISCONCEPTIONS students had about our understanding of the Universe. Students fill this out throughout the lesson if they discover something they thought was a misconception.

Hand out the KCLWM Chart to your students. Have them complete the “K” column, or “What I Know” column, of the chart, indicating what they already know about cosmology. Have students pair-share their answers.

3. *Introductory presentation*

Use the provided presentation to introduce Universe Mash-ups to your class and to guide them through a few of the basic ideas that have led us to our current understanding of the nature of the Universe.

Pause periodically to check for understanding by asking probing questions and to give students time to fill in the “C” and “L” columns of their KCLWM charts.

Video is available here:

- YouTube: <http://youtu.be/28D3soOQb9c>
- TeacherTube:
http://www.teachertube.com/viewVideo.php?video_id=291282
- Download: <http://go.nasa.gov/1a6vsnM>

A sample Universe Mash-up video, *From the Inside Out*, is also available to view. It is formally included in the Exploration (where you can find viewing and downloading options), but you may want to show it to students now, if they aren't clear about what they'll be doing.

4. *Additional introductory activities as required*

The following activities can be used if your students need further introduction to the Cosmic Times materials and topics. The goal is for your students to choose a question or topic to research for their mash-up.

- **Jigsaw Activity** - Students work in teams to learn about how scientists have come to know what they do about the Universe using articles from the Cosmic Times posters. Activity instructions can be found on the Cosmic Times website: <http://go.nasa.gov/1cYCCqo>
- **Gallery Walk** - Students work in small groups, visiting each Cosmic Times poster to answer an open-ended question about the information on that poster. Activity instructions can be found on the Cosmic Times website: <http://go.nasa.gov/1cYCtmP>
- **Four Corners** – Students split into four groups to discuss possible topics for their Universe Mash-up projects. (Activity instructions follow.)

5. *Assessment and Closure*

Have students fill out the “W” column of their K-C-L-W-M chart to help them come up with big questions to research.

Optionally, have students take the Cosmic Times Post Test to assess if they have taken in the main ideas of the Cosmic Times posters. (Post-test answers: 1-D, 2-B, 3-D, 4-A, 5-C, 6-B, 7-D, 8-A, 9-B, 10-C)

Additional Information – Four Corners Activity

Four Corners is a cooperative teaching strategy used here to help students focus in on a topic for their Universe Mash-up project. This activity assumes the students already have some familiarity with the Cosmic Times materials and topics.

Preparation

Label the four corners of the room: Corner 1, Corner 2, Corner 3, Corner 4

Procedure

- Pre-assessment
 - Write on the board:
When it comes to what I know about the Universe, I am an/a _____
EXPERT - Corner 1
AMATEUR - Corner 2
NOVICE - Corner 3
BEGINNER - Corner 4
 - Have students go to the corner they feel best describes them.
 - Students in each corner pair up and share what they know about the Universe. Students paraphrase what their partners said with their partner. Then each student shares with the corner group.
 - One spokesperson from each corner shares with the class.
- Narrow Topic for Universe Mash-up project
 - Write the following on the board:
I am most interested in doing a mash-up project about _____
SCIENTIFIC PROCESS - Corner 1
TECHNOLOGIES - Corner 2
BIOGRAPHIES - Corner 3
FUTURE ENDEAVORS - Corner 4
 - Have students go to the corner that matches their interest.
 - The students in each corner group pair up and share with their partner why they picked that particular corner. Students paraphrase what their partners said with their partner. Then each shares with the corner group.
 - One spokesperson from each corner group shares with the class.
 - Students then go back to their desk and write down one or two particular topics they want to focus on for their Universe Mash-up project.

Additional tips for the Engagement

- If you will be publishing the students' work, make sure to obtain signed permission release forms. This may be a difficult task, so think of creative ways to get students to turn them in early. For example, you can make it a requirement that students turn this in before working on their projects, or you may give extra points to those who turn in their slips early.
- Discover where your students' interests lie. Have students ask big questions and research those questions.
- Here are a few suggested topics for your students
 - Biographical reports on scientists
 - History of Nobel Prizes for astronomy work
 - Exploration of various telescopes, observatories and satellites
 - Stars
 - Galaxies
 - Big Bang
 - Supernovae
 - Measuring distances in astronomy
 - Black holes
 - Dark energy
 - Dark matter
 - Relativity
 - Expanding Universe

Exploration: Pre-production

During the exploration, students will complete the pre-production of their Universe Mash-up projects. They will research a topic, select media (still images, video and audio clips), write a treatment script, create a storyboard, and develop a final script.

Handouts used in the Engagement

- Universe Mash-up Project Overview and Planning (page 21-22)
- Universe Mash-up Grading Rubric (page 23-24)
- Treatment Script worksheet (page 25)
- Storyboard worksheet (page 26)

Classroom Instruction

Once your students have chosen a topic for their mash-up project, they will enter the pre-production phase of their project. The following instructional steps will walk your students through the pre-production phase of their Universe Mash-up projects.



Although students will want to rush into producing their projects, make sure they spend ample time on research, answering their big questions, taking notes and recording their citations.

1. *Review*

Begin by having students review their topics and their essential questions generated from the “W” (What I Wonder?) section of their charts. From this, they should have already picked a topic for their Universe Mash-up project.

2. *Project background and grading*

Hand out the Universe Mash-up Project Overview and Planning and the Universe Mash-up Grading Rubric to students. Use this opportunity to give students the big picture overview of the Universe Mash-up project. The Overview worksheet includes a checklist with due-dates, so you may want to use this time to also layout your expectations for these.

3. *Sample Mash-up*

Tell students that they will now begin pre-production of their projects. Hand out the Treatment Script worksheet. Then have them watch the sample video mash-up, *From the Inside Out*, using the worksheet to guide students’ understanding of the video. As students view the sample mash-up video, stop periodically to give students the opportunity to fill out the worksheet.

The video is available from the following links:

- YouTube: <http://youtu.be/niowTgn-viQ>
- TeacherTube:
http://www.teachertube.com/viewVideo.php?video_id=291281
- Download: <http://go.nasa.gov/14SaClv>

After viewing the film, discuss the sample video and relate the discussion back to production process using their worksheets.

4. *Treatment script*

Using their worksheets as a starting point, students should begin research on their topic, filling in the second part of the Treatment Script worksheet to help formulate a plan for their projects.

Introduce students to the resources in the Universe Mash-up media archive and the Cosmology and Technology Hotlists.

Cosmology Hotlist: <http://www.kn.att.com/wired/fil/pages/listcosmologge.html>

Technology Hotlist: <http://www.kn.att.com/wired/fil/pages/listtechnologe.html>

Emphasize the importance of recording their sources for each part of their research. They need to know where the images and videos they plan to use are located so they can download them when the time comes for video production. They will also need to keep track of credits for the media that they

use, so they give proper citations for the works they use. Make it clear to students that if media has a copyright, they will need to ask permission from the copyright owner to use it. Most of NASA's media is copyright free, but it will still require a credit.

5. *Storyboard*

Once students have their treatment scripts written, they should start to plan out the visual flow of their videos. Hand out the Storyboard worksheet, and have students fill it out, showing the main segments of their final project in the flow of the storyboard. Students may continue research during this phase to ensure they have the visuals they need to tell the story they want to tell.

6. *Final script*

Students next take their storyboard and turn it into a final script. This should include the text for any voice-overs they'd like to include (or text they will put on the screen in place of voice-overs).

Additional tips for the Exploration (Pre-production)

- Finding resources
 - Students should use mainly the Cosmic Times and NASA resources.
 - The Hotlists will help students to navigate the Cosmic Times resources.
 - The Keyword Cloud (<http://go.nasa.gov/1a6xuUN>) is especially helpful to students in locating information on their topics. Clicking on a word in the Keyword Cloud takes you to all of the related resources on that topic. Students will find images, videos and audio clips in the Cosmic Times Media Archive.
- Instruction
 - Using the rubric, begin with the end in mind. Set up expectations for the student's projects early on, so they know exactly how they will be graded.
 - Encourage students to clearly understand their topic so they are able to find their voice and tell their piece of the Universe story creatively.
 - Work with students using the planning sheets so they follow each step.
 - Encourage students to start off with a strong beginning by opening with an interesting title and to personalize credits.
 - It may be nice to help students understand a few media production techniques, for example: a wide or long shot (establishment shot) medium shot (interactions) and a close up (shows emotions).
 - Students may use transitions, sound effects etc. to help tell the story.
 - If you are using the Extension of this lesson and sharing the videos, students should return their permission slips for publishing their projects before moving on to the Explanation and production.
 - If your students need additional help, they might find the Universe Mash-up Hints and How-to handout helpful; it was written by Faith Tucker who made the *From the Inside Out* example Universe Mash-up. Available here: <http://go.nasa.gov/14SbuGx> (PDF download)

Explanation: Video Production and Post-Production

During the explanation, students are involved in producing their video projects. They will use their final script as a guide to determine what media they already have on hand (from the Universe Mash-up Media Archive, for example), and what pieces they'll need to create (such as voice-overs and transition titles) – this is the production phase of the project. Once all of the pieces have been gathered, post-production begins and students assemble their final video mash-up projects.



Handout used in the Explanation

- Universe Mash-up Production Checklist (pages 27-28)

Classroom Instruction

With a final script and storyboard in hand, students are ready to produce their media mash-ups.

1. *Production Checklist*

Hand out the Universe Mash-up Production Checklist worksheets to students and have them fill out the descriptions for all the video clips, audio clips, voice-overs, and images that they will need to assemble their final video.

2. *Production*

Students should download the media they want to use for their projects. They should also begin production of additional media, checking items off their checklists as they go.

Describe the technologies and/or online tools that you and your students will be using and the guidelines that will be established for managing their use.

3. *Post-Production*

With all of their media in hand, students can now assemble their final projects.

As noted in the lesson introduction, most computers now come with video editing software. However, if your school's computers do not have such software readily available, contact your local system administrator for assistance in choosing software to use.

4. *Final project*

When students feel their project is finished, they should output the video into a file format that can be shared with others (such as .mov or .mp4). If you are planning to share student projects via a class blog or wiki or through an online

video-sharing site, make sure you know what file formats can be used by the publishing platform.

Additional tips for the Explanation (Production and post-production)

- Presentation software can often be used to output videos of the slide shows, so this might be a good option if your class does not have access to video-editing software.
- Again, if your students need additional help, they might find the Universe Mash-up Hints and How-to handout helpful; it was written by Faith Tucker who made the *From the Inside Out* example Universe Mash-up. Available here: <http://go.nasa.gov/14SbuGx> (PDF download)

Evaluation

During the Evaluation, students evaluate their own projects based on the grading rubric distributed during the Engagement. Students also receive final scores.

Handout used in the Explanation

- Universe Mash-up Self-Evaluation (page 29)

Classroom Instruction

With the projects finalized, students are ready to evaluate their work and receive evaluations from their teacher.

1. Self Evaluation

Hand out the Self-Evaluation worksheet to students and have them fill out the score they believe they deserve, based on the Universe Mash-up Grading Rubric.

2. Final grades

Grade the student projects using the Grading Rubric. Respond to the student's self evaluation to show where you agree with their assessment and where they may have missed the mark. Make your comments constructive so students see how they could have improved their project if they were given a chance to revise it.

Extension: Sharing the Mash-ups

During the Extension, students share their Universe Mash-up projects. After all, what good is a video project if others don't get to see it?

Classroom Instruction

How students share their videos is largely up to you. However, if you are sharing them on a publicly accessible site, you will need to obtain parental permission to post student works.

If you already have a class blog or wiki, it would be a natural place to post the student projects. If you don't already have a place to share work online with your students, check with your school to see if it has access to such tools. Otherwise, you could look into free online video sharing services (but be sure to get parental permission and/or set the privacy to uploaded student projects to "private" or "friends-only"). Alternatively, you could simply play the videos for the whole class or make the videos available on an in-class computer.



Optionally, you can ask students to give feedback on their classmate's projects. You may want to guide the feedback, asking students to leave one comment that describes something they really liked about each project and a second comment that describes something that confused them about each project. If you have time, or as extra credit, you can invite students to revise their projects (or simply submit a final script reflecting how they would revise their projects) based on the class feedback.

Resources

Resources for Student Projects

Cosmic Times

<http://cosmictimes.gsfc.nasa.gov/index.html>

Cosmology Hotlist

<http://www.kn.att.com/wired/fil/pages/listcosmologge.html>

Technology Hotlist

<http://www.kn.att.com/wired/fil/pages/listtechnologe.html>

Background on Mash-ups in the Classroom

The Art, Skill, Craft, and Magic of Digital Storytelling: A How-Come, How-To Guide, 2008 Edition

http://dsi.kqed.org/images/uploads/KQED_DStoryManual_Ch3_08.pdf

(PDF download)

Berry, P. (2009, spring). Improving student projects with photo story. TechEdge, 28(3), 10-11.

Lamb, B. (2007). Dr. Mashup or, Why Educators Should Learn to Stop Worrying and Love the Remix. Educause Review, 42(4), 12-24. Retrieved from EBSCOhost.

<http://www.educause.edu/ero/article/dr-mashup-or-why-educators-should-learn-stop-worrying-and-love-remix>

Media Mash Up: Public Libraries, Youth and 21st Century Literacy

http://www.hclib.org/extranet/MediaMashup/mediamashup_narrative.pdf

(PDF download)

Place-Based Digital Storytelling Modules

<http://www.pbs.org/nationalparks/for-educators/digital-storytelling/>

Science 360 - The knowledge network

<http://science360.gov>

Name: _____

Date: _____

Teacher: _____

Cosmic Times Keyword Match Pre-test

Match the keywords and phrases in the left column with their definitions in the right column.

1. ____ Einstein's General Theory of Relativity	A. A shift in the observed spectrum of an object due to its motion
2. ____ Dark energy	B. Stars that light up suddenly to great brightness and then fade away
3. ____ Cosmic microwave background	C. Rapid expansion of the Universe after the Big Bang
4. ____ John Mather	D. Galaxies which are farther away are moving away faster
5. ____ Supernovae	E. Matter whose existence is known only through its gravitational pull on other matter
6. ____ Big bang	F. The light from the early Universe
7. ____ Hubble's Law	G. COBE satellite
8. ____ Red shift	H. Explains how gravity works
9. ____ Inflation	I. Leading theory of the origin of the Universe

Name: _____

Date: _____

Teacher: _____

KCLWM Chart

Fill out this chart as your teacher instructs. Use additional sheets as necessary.

Understanding the Universe				
K What I think I know	C What I confirmed	L What I have learned	W What I wonder	M What misconceptions

Big Question How and why has our understanding of the Universe changed over time?	
---	--

Name: _____

Date: _____

Teacher: _____

Cosmic Times Post-test

Circle the correct answer.

1. What immediately followed the Big Bang?
 - A. Microwave Radiation
 - B. Dark Energy
 - C. Dark Matter
 - D. Inflation
2. What phenomenon is used to measure the expansion of the Universe?
 - A. Gravity
 - B. Redshift
 - C. Inflation
 - D. Blueshift
3. The theory of relativity explains:
 - A. Space & Time
 - B. Gravity
 - C. Energy & Mass
 - D. All of the above
4. Which of the following defines "cosmic microwave background"?
 - A. radiation left over by the Big Bang
 - B. rapid expansion of the Universe
 - C. a form of matter
 - D. none of the above
5. Who first mapped the cosmic microwave background?
 - A. Penzias & Wilson
 - B. Albert Einstein
 - C. John Mather
 - D. Alan Guth
6. Who originated the inflationary Universe theory?
 - A. Vera Rubens
 - B. Alan Guth
 - C. Penzias & Wilson
 - D. John Mather
7. Who was Albert Einstein?
 - A. Chemist
 - B. Anthropologist
 - C. Astronomer
 - D. Theoretical Physicist
8. What is the difference between dark energy and dark matter?
 - A. One is a hypothesized form of energy, the other is matter detected by its effect on other matter.
 - B. One is a theory of gravity, the other a theory of energy
 - C. One is a light source, the other radiation.
 - D. There is no difference
9. What do we call stars that get very bright suddenly, then fade away?
 - A. Red Dwarfs
 - B. Blue Giants
 - C. Neutron Stars
 - D. Supernovae
10. In what year of the 6 Cosmic Times Posters was the Big Bang first mentioned?
 - A. 1919
 - B. 1929
 - C. 1955
 - D. 1965
 - E. 1993
 - F. 2006

Name: _____

Date: _____

Teacher: _____

Universe Mash-up Project Overview and Planning

You will be creating a media mash-up project about how we understand our Universe using NASA's Cosmic Times for inspiration. You'll be using existing video clips, audio clips, and images from the Universe Mash-up media archive to explore an aspect of the Cosmic Times materials.

This worksheet gives an overview of the video production process and includes a checklist for your project to help you keep on track. Your teacher will give you additional resources as you work your way through the production process.

Video production process

There are three main phases to making a video: pre-production, production and post-production.

Phase 1: Pre-Production

Pre-production is the planning phase of the project. These steps happen before the camera is turned on or the video-editing software is fired up. The steps should be followed in order.

Choose a topic

Research the topic

Write a **treatment script** – outline the main points and flow

Sketch out a **storyboard** – a visual flow of the scenes

Write the **final script**

Phase 2: Production

Production is the process of creating all pieces of the final video. These steps can happen in any order.

Produce **video** footage

Create **graphics** such as images, photos, or slides

Record **voice-overs** as required by the final script

Choose **music** for the background as appropriate

Name: _____

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Phase 3: Post-Production

In post-production, the final video comes together.

Edit video clips and footage and place the clips in order

Add **audio** tracks to the video

Insert **transitions, titles and music** to the final video

Encode video and output in a format that others can view

Share your video with your class, friends, family, and the world!

Project checklist and due dates

Due date Done?

_____	_____	Pick topic and develop essential question
_____	_____	Research (take notes, record citations, find media)
_____	_____	Write treatment script
_____	_____	Make storyboard
_____	_____	Write final script
_____	_____	Download media to use
_____	_____	Produce additional footage and graphics, if needed
_____	_____	Record narration
_____	_____	Create title, credits graphics
_____	_____	Insert all pieces into presentation software and edit
_____	_____	Score project using rubric and score sheet
_____	_____	Turn in to instructor

Guidelines for video

- Your final video should be 3-5 minutes long and should be accurate and engaging, using the part of the Cosmic Times story that most interests you.
- You will be graded using the Universe Mash-up Project Grading Rubric.
- Make sure the images, videos, and audio you select help tell your story, and make sure to give proper credit for all of the media you use.
- Use only copyright-free materials; if you want to use media that has a copyright, you will need to get permission to use it from the person who holds the copyright.
- Stay with visuals as long as it is interesting – too short a time will make your video seem choppy, while too long will make it drag.
- Make sure your story flows with transitions between different visuals and narration connecting different ideas.
- Speak with a strong, clear voice when narrating.

Name: _____

Date: _____

Teacher: _____

Universe Mash-up Grading Rubric

Category	4 points	3 points	2 points	1 point	Score
Content	<ul style="list-style-type: none"> Covers topic in-depth with a strong central idea Subject knowledge is excellent Uses at least 5 facts and 5 details or examples Uses MLA bibliography and credits 	<ul style="list-style-type: none"> Covers topic with a central idea Subject knowledge is good Uses at least 4 facts and 4 details or examples Uses MLA bibliography and credits 	<ul style="list-style-type: none"> Covers essential information about topic Contains 1-2 factual errors Uses at least 3 facts and 3 details or examples Uses MLA bibliography and credits 	<ul style="list-style-type: none"> Content is minimal Contains several factual errors Uses at least 2 facts and 2 details or examples Missing MLA bibliography or credits 	
Creativity	<ul style="list-style-type: none"> Product shows a large amount of original thought Ideas are creative and inventive Uses 3 or more original ideas based on research that helps others understand the topic 	<ul style="list-style-type: none"> Product shows some original thought Uses at least 2 ideas that are expressed uniquely that can benefit others 	<ul style="list-style-type: none"> Product uses other people's ideas (giving credit), but little evidence of original thought Uses at least 1 idea that is expressed uniquely that can benefit others 	<ul style="list-style-type: none"> Uses other people's ideas, but does not give them credit Does express any ideas uniquely in a way that can benefit others 	
Pre-production	<ul style="list-style-type: none"> Treatment script shows strong evidence of high-level research and detailed planning Storyboard has at least 10 detailed thumbnail sketches Final script shows a logical sequence, good pacing, interesting dialogue and effects 	<ul style="list-style-type: none"> Treatment script shows evidence of research and planning Storyboard contains at least 8 thumbnail sketches Final script shows flow of ideas, pacing, dialogue and effects. 	<ul style="list-style-type: none"> Treatment script shows some evidence of research and planning Storyboard contains at least 5 thumbnail sketches Final script does not flow well between ideas, dialogue and effects 	<ul style="list-style-type: none"> Treatment script shows little evidence of research and planning Storyboard contains fewer than 5 thumbnail sketches Final script is incomplete 	

Name: _____

Date: _____

Teacher: _____

Production	<ul style="list-style-type: none"> • Production techniques demonstrate outstanding technical skills • Clarity of video and audio throughout the video • Uses at least: 10 images, 8 digital effects, one video clip and/or audio clip, and 5 voice-overs • If using text: no more than 8 words per scene, allows time to read, and text is easy to read. • Includes credits and does not use copyrighted resources 	<ul style="list-style-type: none"> • Production techniques demonstrate technical skills • Clarity of video and audio is achieved • Uses at least: 8 images, 6 digital effects, and 3 voice-overs • If using text: no more than 12 words per scene, allows time to read, and text easy to read • Includes credits and does not use copyrighted resources 	<ul style="list-style-type: none"> • Production techniques demonstrate beginner level skills • Clarity of video and audio is evident • Uses at least: 5 images and 1 voice-over • If using text: uses too many words per scene, does not allow time to read, or text is hard to read • Includes credits and does not use copyrighted resources 	<ul style="list-style-type: none"> • Production skills are not evident • Ideas do not flow • Clarity of video and audio is not achieved • Uses fewer than 5 images and no voice-over • If using text: uses too many words per scene, does not allow time to read, and text is hard to read • Does not include credits and/or uses copyrighted resources 	
Organization	<ul style="list-style-type: none"> • Content is well organized by grouping related ideas and using correct sequence • An overall unity and coherence producing a connected flow of content is established 	<ul style="list-style-type: none"> • Content is organized by grouping related ideas and using sequence • There is unity and coherence 	<ul style="list-style-type: none"> • Content is logically organized for the most part 	<ul style="list-style-type: none"> • There was no clear or logical organizational structure, just lots of facts 	
Overall effectiveness	<ul style="list-style-type: none"> • Strong message is conveyed • Video covers topic accurately, clearly, and in depth • Highly engages and impacts the audience 	<ul style="list-style-type: none"> • A central message is conveyed • Video covers topic accurately and clearly • Video engages and impacts the audience 	<ul style="list-style-type: none"> • A central theme is present • Video covers topic with some engagement and impact 	<ul style="list-style-type: none"> • Video is scattered and confusing with no central message evident • Video is not engaging 	

Name: _____

Date: _____

Teacher: _____

Treatment Script

A treatment script is an outline of the main elements of a video or how you treat the video. You may think of the treatment script as the guide of what you will create.

1. Watch the Universe Mash-up example, *From the Inside Out*. Put yourself in the place of the creator of the video and answer the following questions to better understand the video's main elements. These main elements would be the treatment script.
 - What's the theme or central message?
 - Who is the audience?
 - What's the purpose of the video?
 - What's the desired outcome – what do you want the viewer to do, think or feel?
 - What style has been successful with this particular audience in the past?
 - What's new or different about this subject?
 - What's the budget for the production?
 - How long will the finished video be?
2. Think about the project you want to create and then answer those same questions. Use your answers as guidelines as you write your treatment script for your Universe Mash-up.

Name: _____

Date: _____

Teacher: _____

Storyboard

A storyboard is a visual outline of a video. Essentially it is a blueprint for your video so that you know each clip that you'll use and any additional media you'll need to produce to make your final project.

Fill in the following template for your storyboard – use additional pages as necessary. For all clips and images, record where to find them and how the credit for using the image should appear under “Source.” If you need to create the video or image, put “original” under the Source.



Shot 1:

Audio:

Source:



Shot 2:

Audio:

Source:



Shot 3:

Audio:

Source:



Shot 4:

Audio:

Source:



Shot 5:

Audio:

Source:



Shot 6:

Audio:

Source:

Name: _____

Date: _____

Teacher: _____

Universe Mash-up Production Checklist

You will need to take an inventory of the media you will need for your mash-up. Look through your final script and identify all the elements – video clips, audio clips and images. Fill out the lists below. Only when you have all the pieces assembled can you move on to the post-production phase of your project.

Video Clips

Pre-made clips

Downloaded?	Title or description

Original clips (need to be recorded)

Produced?	Title or description

Audio Clips or Voice-Overs

Pre-made clips

Downloaded?	Title or description

Original clips (need to be recorded)

Produced?	Title or description

Name: _____

Date: _____

Teacher: _____

Universe Mash-up Production Checklist (page 2)

Images

Pre-made images

Downloaded?	Title or description

Original images (need to be made)

Produced?	Title or description

Name: _____

Date: _____

Teacher: _____

Universe Mash-up Self Evaluation

Use the Universe Mash-up Grading rubric to determine the score you believe your project has earned. List the evidence to justify your score.

My Cosmic Times Media Mash-up deserves a score of: _____

Justification

My project's Content deserves _____ points, because:

My project's Creativity deserves _____ points, because:

My project's Pre-production deserves _____ points, because:

My project's Production deserves _____ points, because:

My project's Organization deserves _____ points, because:

My project's Overall effectiveness deserves _____ points, because:

Teacher's comments